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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/518,845	12/21/2004	Marie Jacob	FR 020067	1286

24737 7590 01/06/2009
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
P.O. BOX 3001
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EXAMINER	
PARK, EDWARD	
ART UNIT	PAPER NUMBER
2624	
MAIL DATE	DELIVERY MODE
01/06/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/518,845	JACOB ET AL.	
	Examiner	Art Unit	
	EDWARD PARK	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 October 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. In view of the appeal brief filed on 4/30/08, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

2. Claims 1-15 are currently pending.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. **Claims 11, 12, 14, 15** are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent[1] and recent Federal Circuit decisions[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. For example the cited claims do not positively recite any structure within the body of the claim which ties the claim to a statutory category. Furthermore, the examiner suggests that the structure needs to tie in the basic inventive concept of the application to a statutory category. Structure that ties insignificant pre or post solution activity to a statutory category is not sufficient in overcoming the 101 issue.

[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).
[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).
[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. **Claims 1-6, 7/1, 8-12, 13/1, 14, 15** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Metaxas (US 6,295,464 B1) in view of Ryals et al (US 5,803,914).

Regarding **claim 1, 2**, Metaxas discloses an image processing system for displaying information relating to the amplitude of displacements of wall regions of a deformable 3D object under study, the system comprising:

acquisition means for acquiring image data of an image sequence of the 3D object under study (see fig. 15, numeral 403, fig. 1a-e, col. 15, lines 45-62, col. 6, lines 66-67, col. 7, lines 1-18; material points 401 on the surface of and within object 402 are detected by sensor 403, sensor 403 generates a plurality of signals 404 that correspond to respective material points 401; if tissue imaging is continued after the saturation pulse sequence is applied, those dark lines can e seen to move, thereby allowing the tracking of the underlying tissue motion);

processing means for:

processing the 3D object data in the images of the sequence for locating the 3D object wall (see fig. 4, col. 9, lines 44-61; model can be tessellated so that each volume element 201-203 has its triangular faces 204, 205 at the LV's inner and outer walls 206, 207, respectively),

defining regions of interest on the object wall (see fig. 6, col. 9, lines 61-67, col. 10, lines 1-5, forces from each boundary data point P, 220, to the corresponding model wall (inner or outer) can be computed by approximating each boundary triangular element with a plane 223), and

processing the image data of the 3D object wall to determine the amplitude of displacement of each of said regions of interest as a function of time (see fig. 9a-c, col. 12, lines 45-62; typical

motion of an LV model observed at two subsequent time instances, T and T+1, model frames 300, 301, respectively, which shows that the motion at the apex of the LV is relatively small, relatively uniform longitudinal contraction from apex to base can be captured); and constructing a first 2D simplified representation of the 3D object wall by projection of the 3D object wall along an axis, comprising the projections of the regions of interest in said 2D simplified representation, indications of the maximal or minimal amplitudes of displacements of the regions of interest over a period of time (see fig. 9a-c, col. 12, lines 28-67, col. 13, lines 1-18; long-axis views generally coincide with yz-plane 261, the parameter function a3 can capture the longitudinal contraction motion, global translation in the x and the y directions 275, 274, respectively, of the model 2262 frame can be negligible, fig. 9a, a typical motion of an LV model observed at T and T+1, a relatively uniform longitudinal contraction from apex to base can be captured).

Metaxas does not disclose displaying indications of the amplitudes of displacement of each of the regions of interest of the 3D object wall in the respective projections of said regions of interest, called segments, in said constructed 2D simplified representation.

Ryals teaches comprising display means for displaying indications of the amplitudes of displacement of each of the regions of interest of the 3D object wall in the respective projections of said regions of interest, called segments, in said constructed 2D simplified representation (see figure 15, numeral 1528, col. 48, lines 23-46).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Metaxas to display indications of amplitudes of displacement as suggested by

Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claims 3, 4**, Metaxas, with Ryals combination discloses all elements as mentioned above in claim 2. Metaxas with Ryals combination further discloses displaying indication of the instants of time at which the maximum or minimum of amplitudes of displacements occur in the regions of interest, over said period of time, in said 2D simplified phase representation (see Metaxas: figure 9a-9c; col. 12, lines 45-63). Metaxas, with Ryals combination as applied to claim 2 does not disclose constructing a second 2D simplified representation of the 3D object wall called 2D simplified phase representation; displaying 2D simplified phase representation; and means to display the 2D simplified amplitude representation and the 2D simplified phase representation together in a same image.

Ryals teaches constructing a second 2D simplified representation of the 3D object wall called 2D simplified phase representation; displaying 2D simplified phase representation (col. 5, lines 50-67; means for displaying a first image during diastolic phase of a cardiac cycle and systolic phase); and means to display the 2D simplified amplitude representation and the 2D simplified phase representation together in a same image (figure 13; col. 38, lines 27-48).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas with Ryals combination as applied to claim 2 to utilize a phase representation and display it simultaneously with the amplitude representation as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 5**, Metaxas, with Ryals combination discloses all elements as mentioned above in claim 4. Metaxas, with Ryals combination as applied to claim 4 does not teach display the values of amplitude and of time in the respective 2D simplified amplitude representation in a color-coded manner.

Ryals teaches display the values of amplitude (figure 13, numeral 1370) and of time (figure 3, numeral 365) in the respective 2D simplified amplitude representation in a color-coded manner (figure 15, numeral 1528).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas with Ryals combination as applied to claim 4 to display indications of amplitudes of displacement in a color-coded manner as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 6**, Metaxas with Ryals combination discloses all elements as mentioned above in claim 1. Metaxas with Ryals combination as applied to claim 1 does not disclose means to display indications of the amplitudes of displacement of the regions of interest of the 3D object wall in the respective projections of the regions of interest, called segments, in said constructed 2D simplified representation, in a color-coded manner, the indications of the amplitudes of displacement changing in the segments at the rate of the images of the sequence, so as to form an animated 2D simplified representation as a function of time.

Ryals teaches means to display (figure 2, numeral 105) indications of the amplitudes of displacement of the regions of interest of the 3D object wall in the respective projections of the regions of interest, called segments, in said constructed 2D simplified representation, in a color-

coded manner, the indications of the amplitudes of displacement changing in the segments at the rate of the images of the sequence, so as to form an animated 2D simplified representation as a function of time (figure 13; col. 39, lines 39-67; col. 40, lines 1-67).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas with Ryals combination as applied to claim 1 to display indications of amplitudes of displacement in a color-coded manner as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 7/1**, Metaxas with Ryals combination discloses all elements as mentioned above in claim 1. Metaxas with Ryals combination as applied to claim 1 does not disclose means to display the 2D simplified representation of the 3-D object wall as 2D bull's eye representations.

Ryals, in the same field of endeavor, teaches means to display the 2D simplified representation of the 3-D object wall as 2D bull's eye representations (see fig. 14, col. 44, lines 55-67, col. 45, lines 1-67).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas with Ryals combination as applied to claim 1 to utilize a bull's eye representation as suggested by Ryals, in order to enhance "diagnosing cardiac disease and detecting ischemic areas that would otherwise be falsely identified as an infarct" (see col. 45, lines 38-56).

Regarding **claim 8**, Metaxas discloses a heart left ventricle and the regions of interest include the internal boundary of the left ventricle wall (see figures 9a-9c).

Regarding **claim 9**, Metaxas discloses segmentation means for operating a segmentation technique applied to the 3D object under study, which includes using a mesh model technique, and reshaping the mesh model for mapping said mesh model onto the wall of the 3D object under study, so as to provide a simplified volume with a wall, called object wall, that is the object of interest (see col. 7, lines 45-56).

Regarding **claim 10**, Metaxas discloses a suitably programmed computer (see fig. 15, numeral 400) or a special purpose process having circuit means, which are arranged to process image data as claimed in claim 1, and having means to display the processed images (see fig. 15, numerals 410, 411).

Regarding **claims 11, 13/1**, Metaxas discloses an image processing method for processing ultrasound image data and for displaying an ultrasound image of a deformable 3-D organ with indication of the organ wall motions and a computer program product comprising a computer readable medium (see fig. 15) comprising steps of:

acquiring image data of an image sequence of the organ under study (see fig. 15, numeral 403, fig. 1a-e, col. 15, lines 45-62, col. 6, lines 66-67, col. 7, lines 1-18; material points 401 on the surface of and within object 402 are detected by sensor 403, sensor 403 generates a plurality of signals 404 that correspond to respective material points 401; if tissue imaging is continued after the saturation pulse sequence is applied, those dark lines can e seen to move, thereby allowing the tracking of the underlying tissue motion), segmenting the 3-D organ in the images of the sequence for locating the 3D object wall (see fig. 4, col. 9, lines 44-61; model can be tessellated so that each volume element 201-203 has its triangular faces 204, 205 at the LV's inner and outer walls 206, 207, respectively), defining regions of interest on the segmented 3D

organ wall (see fig. 6, col. 9, lines 61-67, col. 10, lines 1-5, forces from each boundary data point P, 220, to the corresponding model wall (inner or outer) can be computed by approximating each boundary triangular element with a plane 223), and processing the image data to determine the amplitude of displacement of each of said regions of interest as a function of time (see fig. 9a-c, col. 12, lines 45-62; typical motion of an LV model observed at two subsequent time instances, T and T+1, model frames 300, 301, respectively, which shows that the motion at the apex of the LV is relatively small, relatively uniform longitudinal contraction from apex to base can be captured);

constructing a first 2D simplified representation of the 3D segmented organ wall by projection of the 3D segmented organ wall along an axis, comprising the projections of the regions of interest in said 2D simplified representation (see fig. 9a-c, col. 12, lines 28-67, col. 13, lines 1-18; long-axis views generally coincide with yz-plane 261, the parameter function a3 can capture the longitudinal contraction motion, global translation in the x and the y directions 275, 274, respectively, of the model 2262 frame can be negligible, fig. 9a, a typical motion of an LV model observed at T and T+1, a relatively uniform longitudinal contraction from apex to base can be captured).

Metaxas does not disclose displaying indications of the amplitudes of displacement of the regions of interest of the 3D segmented organ wall in the respective projections of the regions of interest, called segments, in said constructed 2D simplified representation, in a color coded manner.

Ryals teaches displaying indications of the amplitudes of displacement of the regions of interest of the 3D segmented organ wall in the respective projections of the regions of interest,

called segments, in said constructed 2D simplified representation, in a color coded manner (see figure 15, numeral 1528, col. 48, lines 23-46).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Metaxas to display indications of amplitudes of displacement as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 12**, Metaxas with Ryals combination discloses all elements as mentioned above in claim 11. Metaxas with Ryals combination as applied to claim 11 further discloses displaying indications of the maximal or minimal amplitudes of displacement of each of the regions of interest, over a period of time, this first 2D simplified representation being called 2D simplified amplitude representation (see fig. 9a-c, col. 15, lines 35-44, col. 12, lines 28-67, col. 13, lines 1-18; data thus derived can be displayed in a visually perceptible manner such that the dynamic model shape or dynamic model motion, or both, may be visualized and analyzed; long-axis views generally coincide with yz-plane 261, the parameter function a3 can capture the longitudinal contraction motion, global translation in the x and the y directions 275, 274, respectively, of the model 2262 frame can be negligible, fig. 9a, a typical motion of an LV model observed at T and T+1, a relatively uniform longitudinal contraction from apex to base can be captured). Metaxas with Ryals combination as applied to claim 11 does not teach constructing a second 2D simplified representation of the 3D segmented organ wall, similar to the first 2D simplified representation of the 3D segmented organ wall, and with similar projections of the regions of interest, called segment, this second 2D simplified representation being called 2D simplified phase representation; displaying indications of the instants of time at

which the maximum or minimum of amplitudes of displacements occurs in the regions of interest, over a period of time, in said 2D simplified phase representation; and displaying the 2D simplified amplitude representation and the 2D simplified phase representation in a same image at the same time.

Ryals teaches constructing a second 2D simplified representation of the 3D segmented organ wall, similar to the first 2D simplified representation of the 3D segmented organ wall, and with similar projections of the regions of interest, called segment, this second 2D simplified representation being called 2D simplified phase representation (col. 5, lines 50-67; means for displaying a first image during diastolic phase of a cardiac cycle and systolic phase); displaying indications of the instants of time at which the maximum or minimum of amplitudes of displacements occurs in the regions of interest, over a period of time, in said 2D simplified phase representation (figure 13; col. 38, lines 27-48); and displaying the 2D simplified amplitude representation and the 2D simplified phase representation in a same image at the same time (figure 13; col. 38, lines 27-48).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas, with Ryals combination as applied above in claim 11 to utilize a phase representation and display it simultaneously with the amplitude representation as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 14**, Metaxas with Ryals combination discloses all elements as mentioned above in claim 11. Metaxas with Ryals combination as applied to claim 11 does not teach displaying values of the amplitudes in a color-coded manner.

Ryals, in the same field of endeavor, teaches display displaying values of the amplitudes (figure 13, numeral 1370) in a color-coded manner (figure 15, numeral 1528).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas with Ryals combination as applied to claim 11 to display values of amplitudes of displacement in a color-coded manner as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 15**, Metaxas, with Ryals combination discloses all elements as mentioned above in claim 12. Metaxas, with Ryals combination as applied to claim 12 does not teach displaying values of the amplitudes and of the instants in time in a color-coded manner.

Ryals, in the same field of endeavor, teaches displaying values of the amplitudes (figure 13, numeral 1370) and of the instants in time (figure 3, numeral 365) in a color-coded manner (figure 15, numeral 1528).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas with Ryals combination as applied to claim 11 to display values of amplitudes of displacement in a color-coded manner as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDWARD PARK whose telephone number is (571)270-1576. The examiner can normally be reached on M-F 10:30 - 20:00, (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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